

**GENERAL:** ankle sprains are among the most common reasons for presentation to ED or PCP.

- Syndesmototic ankle sprains, or high ankle sprains, are important to diagnose
  - THEY REQUIRE REFERRAL TO ORTHO, OFTEN FOR SURGERY
  - THEY ARE OFTEN MISSED
- Syndesmototic ligament injuries contribute to chronic ankle instability and are more likely to result in recurrent ankle sprain and chronic scarring (collagen stretches, scar tissue TEARS)
- The distal tibiofibular syndesmosis complex (DTSFC) functions to maintain the relationship between the tibia and fibula at the ankle mortise

**Anatomy** — The distal tibiofibular syndesmosis complex (DTFSC):

- The anterior tibiofibular ligament (ATiFL) attaches to the anterolateral tibial tubercle to the anterior aspect of the fibula. This ligament is weak and often tears easily in most ankle sprains
- The posterior tibiofibular ligament (PTiFL) and the inferior transverse ligament attach the posterolateral tibial tubercle to the posterior aspect of the fibula
- The interosseous ligament is a thick osteofascial membrane that runs the length of the tibia and fibula and terminates distally in the thicker syndesmosis
- The deltoid ligament is the medial stabilizer of the talus that prevents it from translating laterally and putting stress on the fibula and the DTFSC

**EPIDEMIOLOGY:** High ankle sprains account for **10% of all ankle sprains**, most frequently in:

- Contact sports (football especially)
- Sports using rigid boots (skiing, hockey)

**SYMPTOMS:** swelling, ecchymosis, pain

- The area of maximal tenderness may be slightly more proximal where the DTFSC is located. The more proximal the tenderness to palpation extends over the syndesmosis the longer the injury takes to return to play
- The complex is maximally stressed when the ankle is dorsiflexed, externally rotated and/or everted → injury to syndesmosis
  - Patient falls prone on the ground and another player falls or steps on the heel which forcefully externally rotates the ankle
  - Skier whose ski externally rotates and body internally rotates
- Patient may not have classic ankle sprain symptoms or may have been previously diagnosed with a general ankle sprain symptoms, but still have pain >6 months later

**DIAGNOSIS:** provocative tests and location of pain are the KEY to diagnosis! Provocative testing is based on reproducing the talar external rotation or lateral displacement or the splaying of the tibiofibular joint. WITH THESE TESTS A PATIENT WILL HAVE **PAIN AT THE DTFSC** SPECIFICALLY

- **Squeeze test** – The examiner squeezes the more proximal tibia and fibula together. Pain more distally at the tibiofibular syndesmosis complex (DTFSC) indicates a syndesmosis sprain.
- **External rotation stress test** – The patient is seated. The examiner stabilizes the lower leg with the outside hand and provides a gentle external rotation force to the foot with the inside hand which will reproduce pain over the DTFSC
- **Eversion stress test** – The patient is seated with the injured ankle crossed over the opposite leg and the uninjured foot flat on the floor. The examiner applies pressure to the medial side of the knee which causes pain in the DTFSC.
- **Cotton talar translation test** – While holding the lower leg with one hand, the examiner grasps the heel from underneath and moves the talus medially and laterally. Pain or laxity when compared to the uninjured side indicates DTFSC disruption.
- **Fibular drawer** – With the patient in the seated position, the examiner stabilizes the tibia with the inside hand and the outside hand grips the distal fibula between the thumb and index finger. The fibular head in an injured ankle will have asymmetric translation in the anterior posterior plane when compared to the uninjured side. It may also reproduce pain in the tibiofibular ligaments.

**Diagnostic imaging** : Follow OTTOWA ANKLE RULES for when to image

- Radiographic evaluation of the ankle should always include three views of the ankle (AP, Lateral, and mortise view). The following radiographic findings are consistent with a distal tibiofibular syndesmosis complex (DTFSC) injury:
  - Increased space between the distal tibia and fibula at 1 cm above the ankle joint on the AP view consisting of increased clear space (>10 mm) and decreased tibiofibular overlap (<6 mm)
  - Increased clear space (>3 mm) between the medial malleolus and talus indicate lateral translation of the talus and both DTFSC injury as well as deltoid involvement
  - In the chronic injury, there may be calcification of the syndesmosis
  - Widening of the DTFSC as little as 1 mm will decrease the contact area between the tibia and talus by 42 percent and increase the risk for ankle instability and arthritis.

**TREATMENT:** The most predictive factor of ankle instability at six months post-acute injury was the involvement of the DTFSC

- Determine if the ankle is stable or unstable (refer to ortho and get imaging)
  - Stable → less severe high ankle sprains when the placement of the tibia and fibula stays normal.
  - Unstable → two or all three syndesmotic ligaments are torn and the tibia and fibula are free to move around. Unstable injuries require more treatment, and usually surgery.
- Surgical management
  - diastasis of the DFTSC indicated by deltoid ligament involvement and an increased clear space >3 mm medially on plain radiograph as well
  - chronic injuries that have not progressed with proper conservative management for four to six months.
- Surgery: one or two screws are inserted in the lower leg for a few months (usually three) or until the ligaments have reformed and are able to hold the bones in the proper position.

**RECOVERY/FOLLOW UP:** Recovery from a high ankle sprain can take 6 months or longer; about two times longer than other ankle sprains

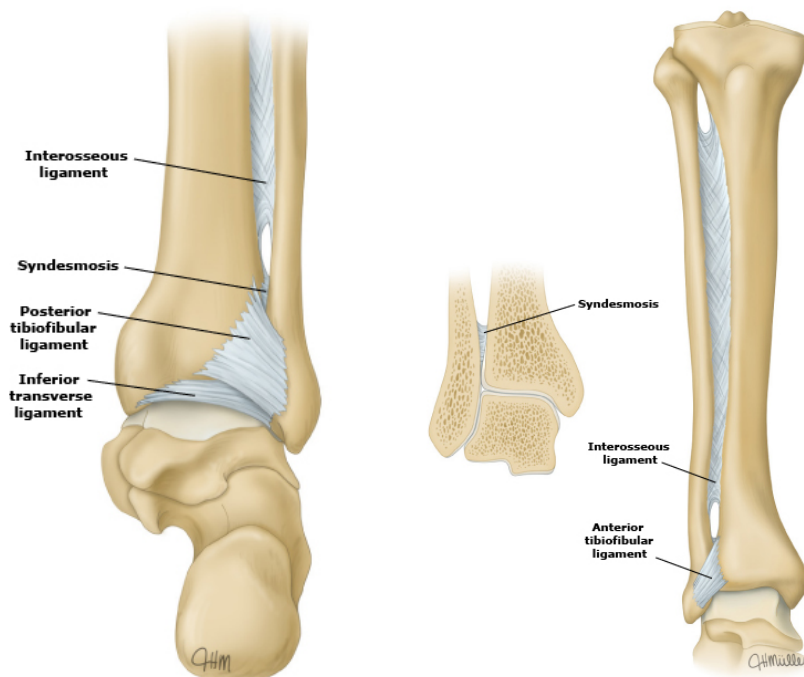
- Tibiofibular compression will approximate the injured structures to optimize the integrity of healing after injury.
- Avoid early resisted eversion rehabilitation and dorsiflexion passive range of motion which may further injure the distal tibiofibular syndesmosis complex.
- Protected weightbearing will minimize the talar dome engagement into the mortise
  - Nonweightbearing from one to three weeks.
  - Partial weightbearing until the patient is able to walk with a normal gait
  - Full weightbearing progresses from walking to jogging, and then running with the patient pain free at each stage before progressing.
- Strengthening the different compartment muscles in the lower leg (especially peroneal muscles)
- See **AAFP article** on general rehabilitation of ankle sprains and specific recommendations
  - Cryotherapy: Icing and RICE within first 48 hours
  - Compression, Support, Bracing: Air stirrup, taping, and lace-up brace for support

- Mobilization: early ROM exercises
- Anti-inflammatory medication – NSAIDs
- Prevention: previous ankle sprain is the greatest risk factor for recurrent injuries!
- Rehabilitation training
  - Proprioceptive exercises: balancing on wobble board
  - Strengthening: resistance band work
  - Plyometrics: squats, jumps

### **ARTICLES/ALGORITHMS**

1. Up to Date: Clinical features and management of ankle pain in the young athlete, Overview of ankle fractures in adults
2. AAFP: AFP Management of Ankle Sprains  
<http://www.aafp.org/afp/2001/0101/p93.html> (2001)  
<http://www.aafp.org/afp/2006/1115/p1714.html> (2006 update)  
<http://www.aafp.org/afp/2012/0615/p1170.html> (2012 update)

### **IMAGES**



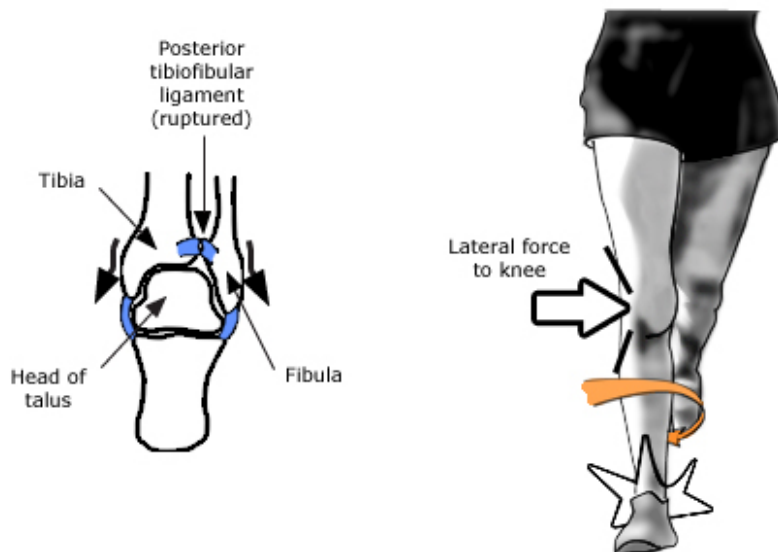
**Posterior tibiofibular ligament and inferior transverse ligament (left)**

1. Posterior view of the key ligamentous attachments between the distal tibia and fibula. The posterior tibiofibular ligament (PTiFL) and the inferior transverse ligament (ITL) attach the posterolateral tibial tubercle to the posterior aspect of the fibula.

#### **Syndesmosis (interosseous ligament) (right)**

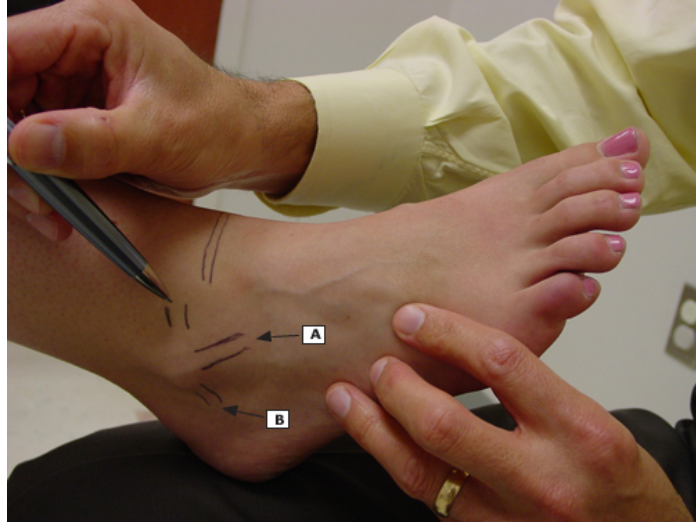
2. Anterior view of the tibia and fibula. The interosseous ligament is a thick osseofascial membrane that runs the length of the tibia and fibula and terminates distally in the thicker syndesmosis.

#### **Syndesmotic sprain**



A syndesmotic sprain can be caused by dorsiflexion and eversion of the ankle with internal rotation of the tibia as shown by the picture on the right. The figure on the left shows a posterior view with injury to the posterior tibiofibular ligament. The anterior tibiofibular ligament cannot be seen in this view but would also be damaged by the injury.

#### **Anterior tibiofibular ligament**



With a syndesmosis sprain, pain occurs in the region of the ruptured anterior tibiofibular ligament (location indicated by the tip of the pen). Also shown are the locations of the anterior talofibular ligament (A) and the calcaneofibular ligament (B).

*Courtesy of Karen Maughan, MD.*

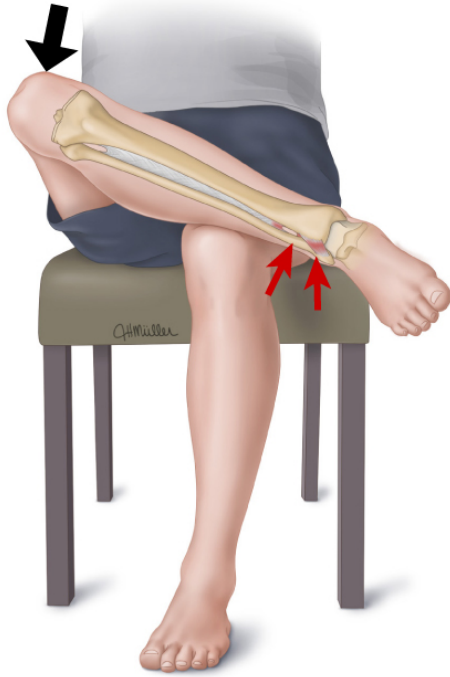
### External rotation stress test



A provocative test for syndesmotic injury. The examiner supports the lateral fibula and tibia with one hand and gently forces external rotation with the other. Pain at the distal syndesmosis (area of pain indicated by the tip of the arrow) confirms distal syndesmotic ligamentous injury.

*Courtesy of Karen Maughan, MD.*

### Ankle eversion stress test (crossed leg test)



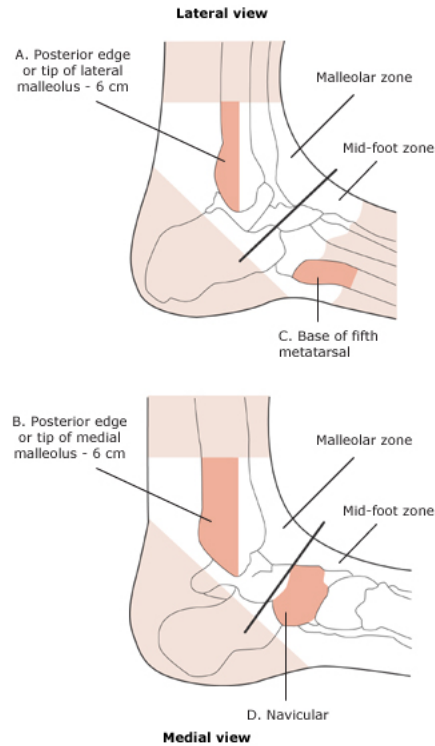
The crossed-leg test is used to detect high ankle (syndesmotic) sprain. When the examiner applies downward pressure to the medial side of the knee (black arrow), the patient will have pain in the distal tibiofibular syndesmosis complex (red arrows).

#### **Radiographic Evidence:**



Radiograph showing widening of tibiofibular “clear space” as a result of disruption of the syndesmosis. The clear space is normally < 5 mm wide.

#### **Ottawa ankle rules**



Ankle films: A series of ankle x ray films is required only if there is any pain in malleolar zone and any of these findings: Bone tenderness at A; Bone tenderness at B; Inability to bear weight both immediately and in the emergency department. Foot films: A series of foot x ray films is required only if there is any pain in mid- foot zone and any of these findings: Bone tenderness at C; Bone tenderness at D; Inability to bear weight both immediately and in the emergency department.

*Modified from Stiell, IG, McKnight, RD, Greenberg, GH, et al, JAMA 1994; 271:827.*